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Algorithm Specification Volume II: Data
Dictionary for the Land Surface
Temperature

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National Aeronautics and
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Goddard Space Flight Center
Greenbelt, Maryland

Joint Polar Satellite System (JPSS) Algorithm Specification

Volume II: Data Dictionary for the Land Surface

Temperature

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Preface

This document is under JPSS Ground ERB configuration control. Once this document is approved, JPSS approved changes are handled in accordance with Class I and Class II change control requirements as described in the JPSS Configuration Management Procedures, and changes to this document shall be made by complete revision.

Any questions should be addressed to:

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Change History Log

Revision	Effective Date	Description of Changes (Reference the CCR & CCB/ERB Approve Date)	Sections Affected
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Rev 0200B	Nov 18, 2014	This version incorporates 474-CCR-14-2119 which was approved by the JPSS Ground ERB on the effective date shown.	All

List of TBx Items

TBx	Type	ID	Text	Action
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1 Introduction

1.1 Scope

The Joint Polar Satellite System (JPSS) Algorithm Specification for Surface Temperature – Volume II: Data Dictionary contains the specifications for the format of the Surface Temperature Intermediate Products (IPs) and Environmental Data Records (EDRs). This specification includes the format of the Hierarchical Data Format Release 5 (HDF5) files, as well as the product definitions. These formats are available to external users of the JPSS. For an overview of the data product formats, see 474-00001-01, JPSS CDFCB-X Vol I. For an overview of the metadata formats for data products, see 474-00448-02-01, JPSS Algorithm Specification Vol. II Data Dictionary for the Common Algorithms.

1.2 Organization

Section	Contents
Section 1	Provides information regarding the scope, and organization of this document, as reference material only.
Section 2	Lists parent documents and related documents that were used as sources of information for this document or that provide additional background information to aid understanding of the interface implementations.
Section 3	Provides an overview of the HDF5 UML for the data product types
Section 4	Provides a description of the contents of each JPSS Intermediate Product associated with this algorithm grouping.
Section 5	Provides a description of the contents of each JPSS EDR associated with this algorithm grouping.
Section 6	Identifies the ancillary and auxiliary data needed for the processing associated with this algorithm grouping if applicable.
Section 7	Provides a description of relevant Look-Up Tables (LUTs) and Processing Coefficient Tables (PCTs) associated with this algorithm grouping.
Appendix A	Provides the Data Mnemonic to Interface Mapping for the data products in this volume.
Appendix B	Provides a mapping of the quality flags by sensor and product that are reportable to the associated data product quality flag Test ID used in the processing environment.
Appendix C	Provides reference to acronyms and glossary of terms found within the JPSS Program Lexicon (470-00041).
Attachment A	Provides the list of applicable xml files for this Data Dictionary.

2 Related Documentation

The latest JPSS documents can be obtained from URL:

https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm. JPSS Project documents have a document number starting with 470, 472 or 474 indicating the governing Configuration Control Board (CCB) (Program, Flight, or Ground) that has the control authority of the document.

2.1 Parent Documents

The following reference document(s) is (are) the Parent Document(s) from which this document has been derived. Any modification to a Parent Document will be reviewed to identify the impact upon this document. In the event of a conflict between a Parent Document and the content of this document, the JPSS Program Configuration Change Board has the final authority for conflict resolution.

Document Number	Title
470-00067	Joint Polar Satellite System (JPSS) Ground System Requirements Document (GSRD)
470-00067-02	Joint Polar Satellite System (JPSS) Ground System Requirements Document (GSRD), Volume 2 – Science Product Specifications
474-00448-01-01	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the Common Algorithms

2.2 Applicable Documents

The following document(s) is (are) the Applicable Document(s) from which this document has been derived. Any modification to an Applicable Document will be reviewed to identify the impact upon this document. In the event of conflict between an Applicable Document and the content of this document, the JPSS Program Configuration Change Board has the final authority for conflict resolution.

Document Number	Title
NPR 7150.2A	NASA Software Engineering Requirements
474-00167	Joint Polar Satellite System (JPSS) Common Ground System (CGS) Requirements Document
474-00005	Government Resource for Algorithm Verification, Independent Testing, and Evaluation (GRAVITE) Requirements Document
N/A	Hierarchical Data Format, Version 5 (HDF5), http://www.hdfgroup.org/HDF5/

2.3 Information Documents

The following documents are referenced herein and amplify or clarify the information presented in this document. These documents are not binding on the content of this document.

Document Number	Title
474-00051	Joint Polar Satellite System (JPSS) VIIRS Land Surface Temperature Algorithm Theoretical Basis Document (ATBD)
474-00448-03-21	JPSS Algorithm Specification Volume III: Operational Algorithm

Document Number	Title
	Description (OAD) for the Surface Temperature
474-00333	Joint Polar Satellite System (JPSS) Ground System (GS) Architecture Description Document (ADD)
474-00054	Joint Polar Satellite System (JPSS) Ground System (GS) Concept of Operations (ConOps)
470-00041	Joint Polar Satellite System (JPSS) Program Lexicon
CCSDS 301.0-B-3	Time Code Formats Blue Book available at http://www.ccsds.org
WMO Publication 306	Manual on Codes, FM92 GRIB Edition 2 Version 2 of 5 Nov 2003, available at http://www.wmo.ch/web/www/DPS/grib-2.html .
ISO/IEC 10646	ASCII Standard, the Corresponding International Standards Organization (ISO) standard
474-00001-01	Joint Polar Satellite System (JPSS) Common Data Format Control Book, Vol I – Overview
474-00448-02-01	Joint Polar Satellite System (JPSS) Algorithm Specification Volume II: Data Dictionary for the Common Algorithms

3 UML for HDF5 Products

The following paragraphs describe the structure and contents of the IP and EDR granules formed by the JPSS ground processing software.

3.1 Intermediate Products and Environmental Data Records HDF5 Details - Statically Sized

Figure 3.1-1, Generalized UML Diagram for statically sized HDF5 IP/EDR Files, depicts the HDF5 IP/EDR organization as a Unified Modeling Language (UML) class diagram. Each HDF5 IP/EDR file contains an HDF5 Root Group, '/', a Data Products Group, Product Groups (Collection Short Name), an optional Geolocation Group (depending upon packaging option, see the JPSS CDFCB-X Vol. I, for a description of the geolocation packaging), and an All Data Group (dataset arrays). The Product Groups and Geolocation Group both contain datasets - an Aggregation Dataset (Collection Short Name_Agg) and Granule Datasets (Collection Short Name_Gran_n) - where n indicates the nth granule in a temporal aggregation of granules (1 .. n). A granule is a general term used to describe the minimum quanta of data collected per processing period, generally on the order of seconds. For the definition and organization of the metadata attributes contained in the HDF5 files, see the JPSS Algorithm Specification Vol. II: Data Dictionary for the Common Algorithms, 474-00448-02-01. Attributes that are specific to a particular IP/EDR are listed with the specific IP/EDR's data format definition. For the generalized formats and packaging options for the Geolocation data, see the JPSS CDFCB-X Vol. I - Overview.

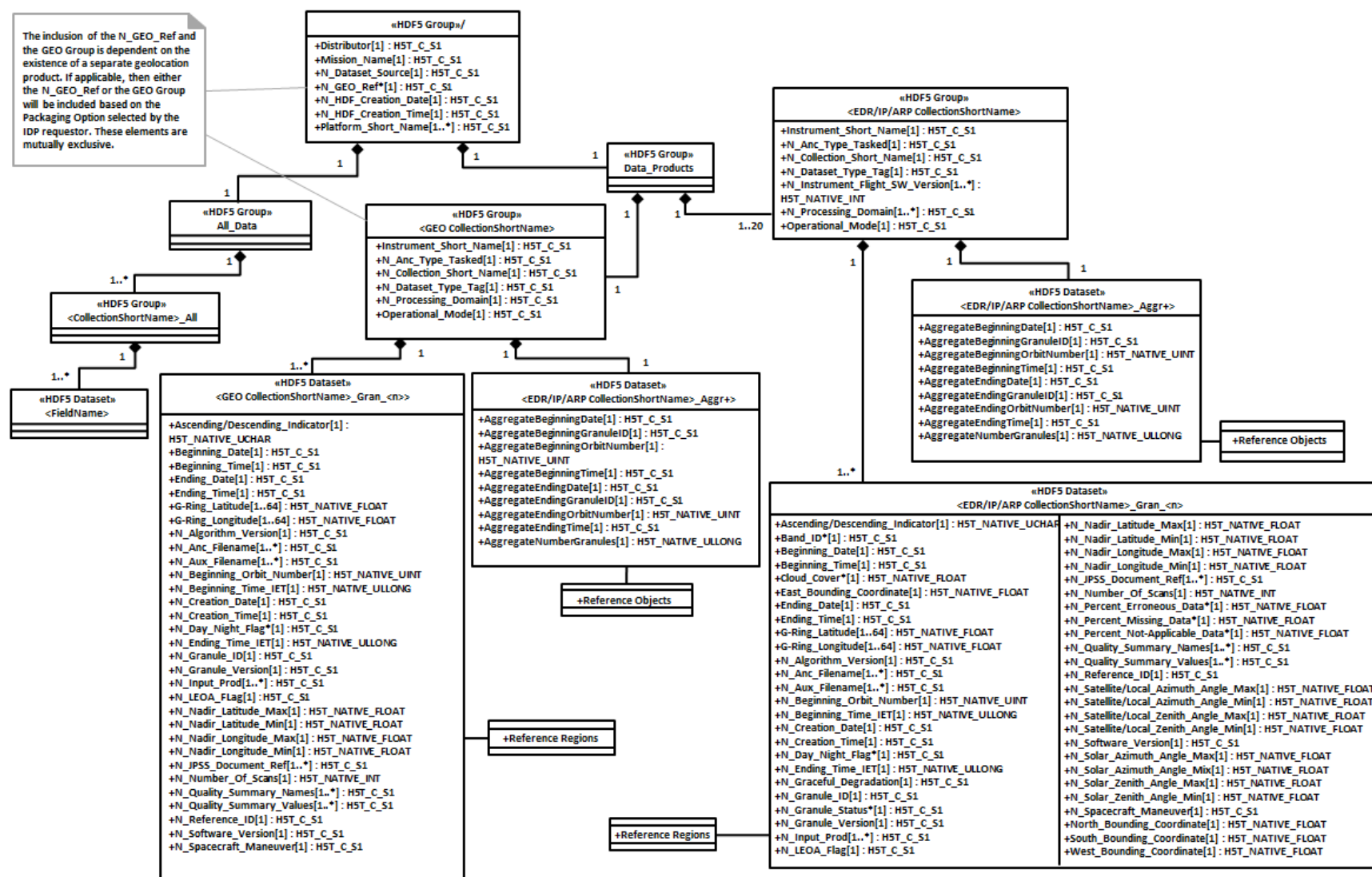


Figure: 3.1-1 Generalized UML Diagram for statically sized HDF5 IP/EDR Files

3.2 Intermediate Products, Application Related Products and Environmental Data Records HDF5 Details - Dynamically Sized

Figure 3.2-1, Generalized UML Diagram for dynamically sized HDF5 IP/EDR Files, depicts the HDF5 IP/EDR organization as a Unified Modeling Language (UML) class diagram for products that contain dynamically sized fields. Dynamically sized means that a field's length will vary from granule to granule. The organization of the HDF5 file is identical to the statically sized HDF5 file with the exception of the aggregation and corresponding All_Data group. For statically sized products, the object ID stored in the aggregation array points to a Dataset_Array under the All_Data group. This Dataset_Array is a single HDF5 dataset for each field. This single HDF5 dataset contains all the data for all granules in the file for a given field. However, for dynamically sized products, the object ID stored in the aggregation array points to an HDF5 group instead. This HDF5 group contains one or more datasets - a separate dataset for each granule for a given field. The dataset is named "Dataset_Array_Gran_n".

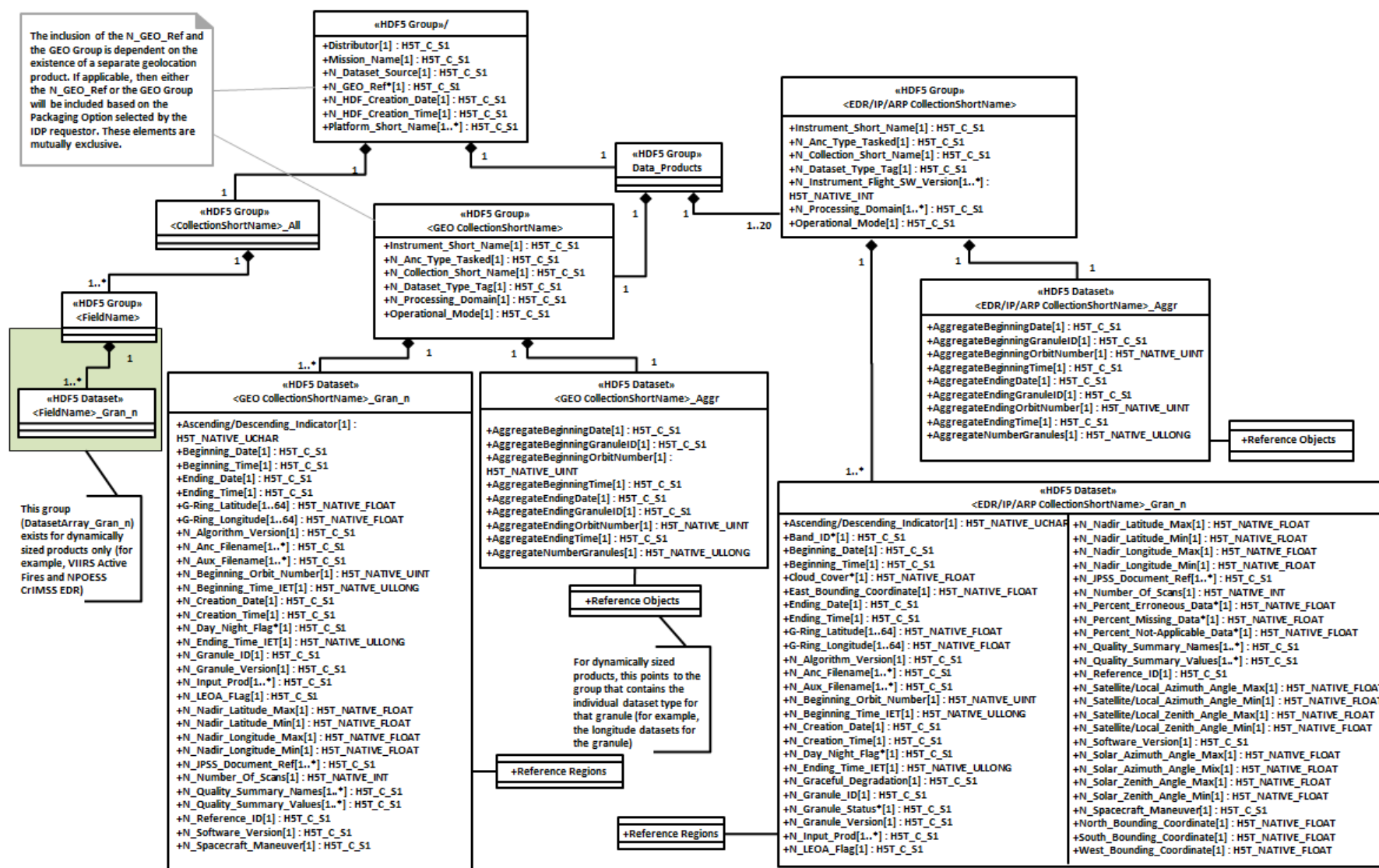


Figure: 3.2-1 Generalized UML Diagram for dynamically sized HDF5 IP/EDR Files

4 Intermediate Products (IPs)

Not Applicable

5 Environmental Data Records (EDRs)

Environmental Data Records (EDRs) are data records that contain the environmental parameters or imagery generated by the JPSS system as products deliverable to the user. The JPSS and S-NPP required set of EDRs are defined in 470-00067-02, the JPSS Ground System Requirements Document, Vol 2. An EDR is either an official EDR, which means that it is part of the set of official JPSS Data Products, or it is a substitute EDR. A substitute EDR is produced by substitute ancillary data, data defined by the IDP operator in order to create a data product using different input (specifically, different ancillary data) than that which is prescribed by JPSS. EDRs provide stable measurements useful for long-term trends. An EDR contains the following:

- EDR specific data (as described in each section)
- Appropriate geolocation values
- Quality Flags
- Metadata represented as Attributes in the HDF5 file that are provided at the granule and aggregation level
- The EDRs are separated by category and are presented alphabetically within each category. All S-NPP EDRs are also delivered during JPSS, thus only those EDRs which are JPSS-only are annotated as such within their respective Description/Purpose section of their interface definition.

5.1 Land Environmental Data Records

For an overview of the CDFCB-X and the list of reference documents, see the JPSS CDFCB-X Vol. I - Overview, 474-00001-01.

5.1.1 Land Surface Temperature

Data Mnemonic	EDRE-VLST-C0030 (Official) EDRE-VLST-C0031 (Substitute)
Description/ Purpose	The VIIRS LST algorithms are based on physical regression methods to retrieve skin LST. They use radiances sensed by VIIRS Infrared (IR) channels. Land Surface Temperature (LST) is defined as the skin temperature of the uppermost layer of the land surface. The LST EDR is required only for horizontal cells that are categorized as “confidently clear” by the cloud mask. Sensors: VIIRS Effectivity: S-NPP and JPSS
File-Naming Construct	See the JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4 for details.
File Size	Estimated Granule Size: See Table: 5.1.1.1-1 VIIRS Land Surface Temperature EDR Data Content Summary for size.
File Format Type	HDF5
Data Content and Data Format	See Section 5.1.1.1, VIIRS Land Surface Temperature EDR Data Content Summary See Section 5.1.1.2, VIIRS Land Surface Temperature EDR Product Profile

	See Section 5.1.1.3, VIIRS Land Surface Temperature EDR HDF5 Details See Section 5.1.1.4, VIIRS Land Surface Temperature EDR HDF5 Metadata Details See Section 5.1.1.5, VIIRS Land Surface Temperature EDR Geolocation Details
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5.1.1.1 VIIRS Land Surface Temperature EDR Data Content Summary

Table: 5.1.1.1-1 VIIRS Land Surface Temperature EDR Data Content Summary

Name	Description	Data Type	Aggregate Dimensions (N = Number of Granules)	Granule Dimensions	Units
LandSurfaceTemperature	Land Surface Temperature	unsigned 16-bit integer	[N*768, 3200]	[768, 3200]	Kelvin
QF1_VIIRSLS TEDR	Pixel level Quality Flags	unsigned 8-bit char	[N*768, 3200]	[768, 3200]	unitless
QF2_VIIRSLS TEDR		unsigned 8-bit char	[N*768, 3200]	[768, 3200]	unitless
QF3_VIIRSLS TEDR		unsigned 8-bit char	[N*768, 3200]	[768, 3200]	unitless
LSTFactors	Scale = First Array Element; Offset = 2nd Array Element	32-bit floating point	[N*2]	[2]	scale = unitless; offset = Kelvin
File Size	12,288,008 Bytes				

5.1.1.2 VIIRS Land Surface Temperature EDR Product Profile**Table: 5.1.1.2-1 VIIRS Land Surface Temperature EDR Product Profile****VIIRS Land Surface Temperature EDR Product Profile**

Fields														
Name	Data Size	Dimensions												
LandSurfaceTemperature	2byte(s)	Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size								
		AlongTrack	Yes	No	768	768								
		CrossTrack	No	No	3200	3200								
		Datum												
		Description	Datum Offset	Unscaled Valid Range Min		Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values		Legend Entries		
		Land Surface Temperature	0	183.20	350.00	Kelvin	Yes	LSTFactors	unsigned 16-bit integer	Name	Value	Name	Value	
										NA_UINT16_FILL	65535			
										MISS_UINT16_FILL	65534			
										ONBOARD_PT_UINT16_FILL	65533			
										ONGROUND_PT_UINT16_FILL	65532			
								ERR_UINT16_FILL	65531					
								ELLIPSOID_UINT16_FILL	65530					
								VDNE_UINT16_FILL	65529					
								SOUB_UINT16_FILL	65528					

VIIRS Land Surface Temperature EDR Product Profile - Quality Flags

Fields													
Name	Data Size	Dimensions											
QF1_VIIRSLST EDR	1byte(s)	Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size							
		AlongTrack	Yes	No	768	768							
		CrossTrack	No	No	3200	3200							
		Datum											
		Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values		Legend Entries	
		LST Quality (Indicates the quality of the pixel level retrieval)	0	MIN_VAL	MAX_VAL	unitless	No		2 bit(s)	Name	Value	Name	Value
												High	0
												Medium	1
												Low	2
						No Retrieval	3						
Algorithm (Indicates which algorithm branch was implemented)	2	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value		
										4-Band Dual	0		

												Split Window		
												2-Band Split Window		1
		Day/Night	3	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value	
												Night (Solar Zenith Angle > 85 Degrees)		0
												Day (Solar Zenith Angle <= 85 degrees)		1
		Bad SWIR Pixel (M12 and M13 band data not available)	4	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value	
												Both Available		0
												At least one not available		1
		Bad LWIR Pixel (M15 and M16 band data not available)	5	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value	
												Both Available		0
												At least one not available		1
		Exclusion - Fire detected in pixel (from the VIIRS Cloud Mask)	6	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name		
												False		0
												True		1
		Exclusion - Thin Cirrus (Retrieval performance exclusion due to thin cirrus detection by VIIRS Cloud Mask)	7	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value	
												False		0
												True		1

QF2_VIIRSLST EDR	1byte(s)	Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size								
		AlongTrack	Yes	No	768	768								
		CrossTrack	No	No	3200	3200								
		Datum												
		Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values		Legend Entries		
		Degradation - Sensor Zenith Angle > 40 degrees	0	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value	
												False		0
												True		1
		Out of Expected Range - The LST derived from the algorithm is outside of the NPOESS System Specification Validated Range defined by 213K < BT(M16) < 343K	1	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value	

QF3_VIIRSLST EDR	1byte(s)										False	0	
											True	1	
		Cloud Confidence Indicator	2	MIN_VAL	MAX_VAL	unitless	No		2 bit(s)	Name	Value	Name	Value
												Confidently Clear	0
												Probably Clear	1
												Probably Cloudy	2
												Confidently Cloudy	3
		Exclusion: AOT > 1.0 (AOT in horizontal cell > 1.0 on the slant path (AOT @550nm))	4	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value
												False	0
												True	1
		Exclusion - Horizontal Cell Size > 1.3km (HCS > 1.3 km, swath width > 1700 km, Sensor Zenith Angle > 53.0 degrees)	5	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value
												False	0
												True	1
		Sun Glint in pixel (as indicated in the VIIRS Cloud Mask)	6	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value
												False	0
												True	1
		Inside Terminator (85 deg < Solar Zenith Angle <= 100 deg)	7	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	Name	Value	Name	Value
												False	0
												True	1
				Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size					
				AlongTrack	Yes	No	768	768					
				CrossTrack	No	No	3200	3200					
				Datum									
				Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values	
		Land/Water Background	0	MIN_VAL	MAX_VAL	unitless	No		3 bit(s)	Name	Value	Name	Value
												Land and Desert	0
												Land/No Desert	1
												Inland Water	2
												Sea Water	3
												Coastal	
		Surface Type (of the LST Retrieval)	3	MIN_VAL	MAX_VAL	unitless	No		5 bit(s)	Name	Value	Name	Value
												Evergreen Needleleaf Forests	1
												Evergreen Broadleaf	2

[illegible]

Fields														
Name	Data Size	Dimensions												
LSTFactors	4byte(s)	Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size								
		Granule	Yes	No	2	2								
		Datum												
		Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values		Legend Entries		
		Scale = First Array Element; Offset = 2nd Array Element	0	MIN_VAL	MAX_VAL	scale = unitless; offset = Kelvin	No		32-bit floating point	Name	Value	Name	Value	

5.1.1.3 VIIRS Land Surface Temperature EDR HDF5 Details

Figure 5.1.1.3-1, VIIRS Land Surface Temperature EDR UML Diagram, provides details on the contents and data types of the Land Surface Temperature EDR product. This UML provides details at the product level detail only. In addition to this UML, refer to Figure 3.1-1, Generalized UML Diagram for statically sized HDF5 IP/EDR Files, for a complete UML rendering of this product.

VIIRS-LST-EDR
+LandSurfaceTemperature : H5T_NATIVE_USHORT
+QF1_VIIRSLSTEDR : H5T_NATIVE_UCHAR
+QF2_VIIRSLSTEDR : H5T_NATIVE_UCHAR
+QF3_VIIRSLSTEDR : H5T_NATIVE_UCHAR
+LSTFactors : H5T_NATIVE_FLOAT

Figure: 5.1.1.3-1 VIIRS Land Surface Temperature EDR HDF5 UML Diagram

5.1.1.4 VIIRS Land Surface Temperature EDR HDF5 Metadata Details

The HDF5 metadata elements associated with the VIIRS Land Surface Temperature EDR are listed in the JPSS Algorithm Specification Vol. II: Data Dictionary for the Common Algorithms, 474-00448-02-01. The VIIRS EDR metadata includes all of the common metadata at the root, product, aggregation, and granule levels.

In addition to the common metadata items for this product, Table 5.1.1.4-1, VIIRS Land Surface Temperature EDR Quality Summary Metadata Values, provides the following items as name/value pairs. The listed name/value pair items in the table are the granule level quality flags for the VIIRS Land Surface Temperature EDR.

Table: 5.1.1.4-1 VIIRS Land Surface Temperature Quality Summary Metadata Values

N_Quality_Summary			
Name	Value	Description	Comments
AOT Input Data Quality	0 - 100	Percent of pixels with high quality input values for AOT (valid only during day)	
Exclusion Summary	0 - 100	Percent of pixels with excluded conditions	
Land Surface Temperature EDR Summary Quality	0 - 100	Percent of pixels within granule with high quality of retrieval	
No Land Coverage	0 - 1	0 = At least one land pixel in granule; 1 = No land pixels in granule	
SDR Input Data Quality	0 - 100	Percent of pixels with high quality input values of brightness temperature in VIIRS SDR	

N_Quality_Summary			
Summary Range Check	0 - 100	Percent of retrieved pixels outside of expected range (213K to 343K)	
Surface Type Input Data Quality	0 - 100	Percent of pixels with high quality input values for Surface Type	
VCM Input Data Quality	0 - 100	Percent of pixels with high quality input values for the VIIRS Cloud Mask	

5.1.1.5 VIIRS Land Surface Temperature EDR Geolocation Details

VIIRS Land Surface Temperature is produced on the VIIRS Moderate Resolution Geolocation - Terrain Corrected. See the JPSS Algorithm Specification Vol. II: Data Dictionary for VIIRS RDR/SDR, 474-00448-02-06, Section 6.2, VIIRS Moderate Resolution Geolocation - Terrain Corrected for details.

6 Ancillary and Auxiliary Data Inputs

Not applicable.

7 Look-up Tables and Processing Coefficient Tables

The template used for these formats in this document is described below.

Data Mnemonic: This is a unique identifier. JPSS CDFCB-X Vol. I, 474-00001-01 describes the data mnemonic definition methodology.

Description/Purpose: A brief description of the data format and its purpose.

Instrument: Identification of the Instrument associated with the table.

File-Naming Construct: A description of the file-naming constructs for those data units that apply. JPSS CDFCB-X Vol. I, 474-00001-01 defines file-naming conventions.

File Size: The size of the data file.

File Format Type: The format type of the data file.

Production Frequency: Production frequency is the interval of time for data generation. A production frequency equal to dynamic implies that it is only as requested or as needed.

Data Format/Structure: This defines the actual data format. The definitions provide information for every data element in the data unit.

The following rules apply to all tables:

1. All field names mandatory, unless specified otherwise.
2. Fill data is specified, where applicable.
3. Strings are left-aligned and integers are right-aligned, unless specified otherwise.
4. For information regarding Coordinated Universal Time (UTC) and IDPS Epoch Time (IET) conventions, see the JPSS CDFCB-X Vol. I, 474-00001-01.
5. For all references of the ASCII Standard, the corresponding International Standards Organization (ISO) standard is ISO/IEC 10646. The specific Unicode is UTF8, unless stated otherwise.
6. The fields are presented in order (either top – down or most significant first), unless stated otherwise.

7.1 Look Up Tables

Algorithm Look-up Table (LUT) files contain tables of pre-computed values used in lieu of real-time algorithm computations to reduce processing resource demands. Table values are typically the result of RTM executions and other environmental model simulations. These data generally cover broad, multi-dimensional parameter spaces which are unique to each algorithm.

7.1.1 VIIRS Land Surface Temperature LUTs

7.1.1.1 VIIRS Land Surface Temperature EDR LUT

Data Mnemonic	NP_NU-LM0233-009
Description/ Purpose	The VIIRS Land Surface Temperature LUT file contains the regression coefficients for baseline and fallback algorithms. Includes

	values for both day and night time. This file is used in the VIIRS Land Surface Temperature IP algorithm
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table – see the JPSS CDFCB-X Vol. I, 474-00001-01, for the applicable Collection Short Names.
File Size	See Table: 7.1.1.1-1 VIIRS Land Surface Temperature EDR LUT Format for size
File Format Type	Binary
Production Frequency	As needed
Data Content and Data Format	For details see Table 7.1.1.1-1, VIIRS Land Surface Temperature LUT Data Format

Table: 7.1.1.1-1 VIIRS Land Surface Temperature EDR LUT Format

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
StipCoeffs	64	32-bit floating point	MIN_VAL - MAX_VAL	unitless	LUT Coefficients / ST IP LUT data file 3 Dimensional Array: terms x dn x algSize of Dimension(s): 4 x 2 x 2
File Size	64 Bytes				

7.1.1.2 VIIRS LST LUT

Data Mnemonic	NP_NU-LM0233-012
Description/ Purpose	The VIIRS Land Surface Temperature (LST) LUT file contains regression coefficients for each of the 17 IGBP land cover types for baseline and fallback algorithms. This file contains values for both day and night time. This file is used in the VIIRS LST algorithm.
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table – see the JPSS CDFCB-X Vol. I, 474-00001-01, for the applicable Collection Short Names.
File Size	See Table: 7.1.1.2-1 VIIRS LST LUT Data Format
File Format Type	Binary
Production Frequency	As needed
Data Content and Data Format	For details see Table 7.1.1.2-1, VIIRS LST LUT Data Format

Table: 7.1.1.2-1 VIIRS LST LUT Data Format

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
LstLut	4896	64-bit floating point	MIN_VAL - MAX_VAL	unitless	<p>Dual Window has 9, Split Window has 5 for term Details: Day or Night: Index 0 = night, index 1 = day Surface Type: Indices 0 - 16 correspond to the Surface Type values in the Surface Type EDR (IGBP values of 1-17) Algorithm: Index 0 = 'dual', Index 1 = 'split'</p> <p>5 Dimensional Array: Term x Day or Night x Surface Type x Algorithm x Regime Size of Dimension(s): 9 x 2 x 17 x 2 x 1</p>
File Size	4,896 Bytes				

7.2 Processing Coefficient Tables

The S-NPP/JPSS-1 ground system data product generation subsystem uses Processing Coefficient Table (PCT) file parameters. PCT files can be either Automated or Manual coefficient tables. Within the Manual table type are two coefficient classes: Initial and Ephemeral. Sections below describe all three and any tables of that type for the product.

7.2.1 Automated Processing Coefficients

Automated Processing Coefficient (PC) files contain parameters updated and/or created during the processing of the S-NPP/JPSS Data Products by the processing algorithms. The processing environment subsequently uses these files without human review of their contents. Files can be used immediately after creation or in future processing such as the next granule in the production data stream processing.

7.2.1.1 VIIRS Land Surface Temperature Automated PCs

VIIRS Land Surface Temperature product generation currently uses no Automated PCs.

7.2.2 Manual Processing Coefficients

Manual Processing Coefficient (PC) files contain parameters used for S-NPP/JPSS Data Product generation which require human review prior to operational processing environment insertion. Manual Processing Coefficients have two classes:

- Initialization PCTs contain infrequently updated initial parameters sets S-NPP/JPSS uses for data product generation.
- Ephemeral PCTs contain frequently updated parameters sets S-NPP/JPSS uses for data product generation.

7.2.2.1 VIIRS Land Surface Temperature Initialization PCTs

VIIRS Land Surface Temperature product generation currently uses no Initialization PCTs

7.2.2.2 VIIRS LST EDR Ephemeral PCT

Data Mnemonic	DP_NU-LM2020-022
Description/ Purpose	The VIIRS Land Surface Temperature Ephemeral PC provides tunable processing coefficients for use by the algorithm during execution. The coefficients can be modified (tuned) through a configuration control process in response to algorithm, performance, inputs, sensitivity, etc. changes.
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table – see the JPSS CDFCB-X Vol. I, 474-00001-01, Table B-1 for the applicable Collection Short Names.
File Size	See Table: 7.2.2.2-1 VIIRS LST EDR Ephemeral PC
File Format Type	Binary
Production Frequency	As needed
Data Content and Data Format	For details see Table 7.2.2.2-1, VIIRS LST EDR Ephemeral PC Data Format

Table: 7.2.2.2-1 VIIRS LST EDR Ephemeral PC

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
min_Bt_M12_M13	4	32-bit floating point	Initially set to 180	Kelvin	Min Brightness Temp for M12 and M13
max_Bt_M12_M13	4	32-bit floating point	Initially set to 350	Kelvin	Max Brightness Temp for M12 and M13
min_Bt_M15	4	32-bit floating point	Initially set to 180	Kelvin	Min Brightness Temp for M15
max_Bt_M15	4	32-bit floating point	Initially set to 350	Kelvin	Max Brightness Temp for M15
min_Bt_M16	4	32-bit floating point	Initially set to 180	Kelvin	Min Brightness Temp for M16
max_Bt_M16	4	32-bit floating point	Initially set to 350	Kelvin	Max Brightness Temp for M16
day_Sol_Zen_Ang	4	32-bit floating	Initially set to	radians	Solar Zenith

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
_Lim		point	1.4835		Angle defining Day/Night Boundary
min_Hcs_Sens_Zen_Lim	4	32-bit floating point	Initially set to 0.0	radians	Sensor Zenith Angle at Nadir
max_Hcs_Sens_Zen_Lim	4	32-bit floating point	Initially set to 0.925	radians	Sensor Zenith Angle at Edge of Scan
min_Term_Lim	4	32-bit floating point	Initially set to 1.4835	radians	Min Solar Zenith Angle Defines Terminator
max_Term_Lim	4	32-bit floating point	Initially set to 1.7453	radians	Max Solar Zenith Angle Defines Terminator
lst_Min_Rept_Range	4	32-bit floating point	Initially set to 213	Kelvin	Minimum Land Surface Temperature Threshold
lst_Max_Rept_Range	4	32-bit floating point	Initially set to 343	Kelvin	Maximum Land Surface Temperature Threshold
max_Sens_Zen_Lim	4	32-bit floating point	Initially set to 0.6981	radians	Sensor Zenith Degradation Limit
algmode	4	32-bit integer	0 or 1	unitless	Algorithm mode switch 0: Use 4-band dual split-window algorithm 1: Use 2-band single split-window algorithm
File Size	60 Bytes				

Appendix A. Data Mnemonic to Interface Mapping

For a complete list of Data Mnemonic to Interface Mapping, see 474-00001-01, JPSS CDFCB-X Vol I. The CDFCB contains Data Mnemonics, Identifiers, Collection Short Names, Interface Documents, and Collection Long Names for each JPSS Data Product and for Geolocation data.

Appendix B. DQTT Quality Flag Mapping

The following table maps the quality flags by sensor and product that are reportable to the associated data product quality flag Test ID used in the processing environment.

Table: B-1 DQTT Quality Flag Mapping

Algorithm	Product	Test ID	Quality Flag
Land Surface Temperature	VIIRS-LST-EDR	5400	Summary Land Surface Temperature Quality
Land Surface Temperature	VIIRS-LST-EDR	5401	Exclusion Summary
Land Surface Temperature	VIIRS-LST-EDR	5402	Summary Range Check

Appendix C. Abbreviations and Acronyms

See 470-00041 JPSS Program Lexicon for abbreviations and acronyms.

Attachment A. XML Formats for Related Products**Table: ATT-1 XML Formats for Related Products**

File Number	XML Filename
1	474-00448-02-21_JPSS-LST-DD-Part-21_VIIRS-LST-PP.xml